

Cardiac Masses

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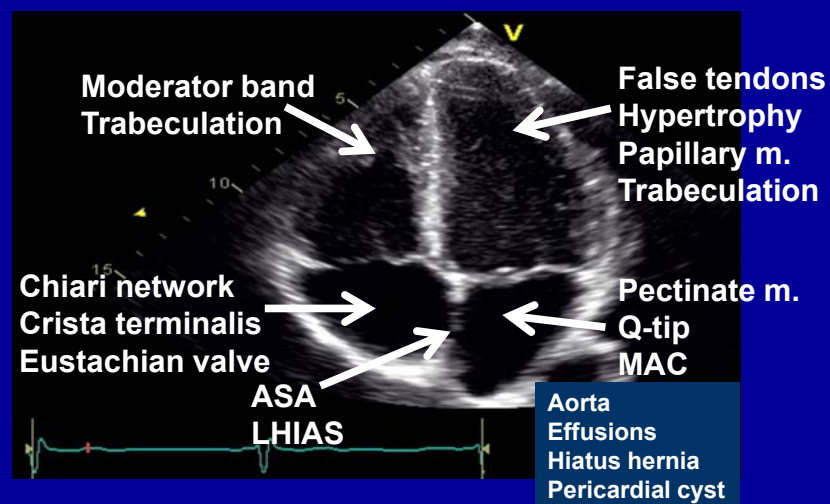
Cardiac Masses: Considerations

- **Definition of the mass**
 - Nature
 - Location
 - Benign or malignant
- **Presentation**
 - Incidental finding
 - Obstruction
 - Direct myocardial involvement
 - Embolization
 - Constitutional or systemic symptoms
 - Patient characteristics
- **Echocardiography remains 1^o imaging modality**
 - Multimodality imaging may be required for characterization

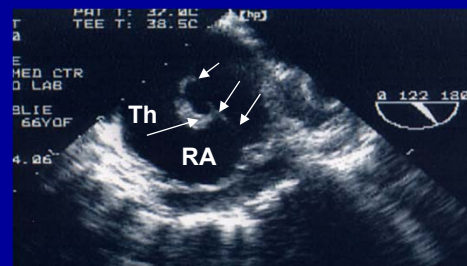
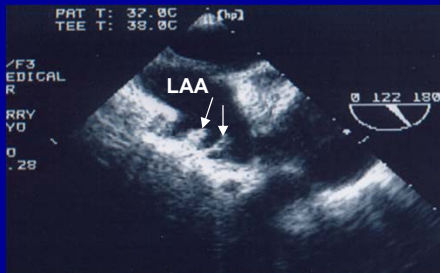
Cardiac Masses: Differential Diagnosis

- Anatomical variants
- Implanted devices
- Thrombus
- Vegetations
- Tumors
 - Primary
 - Metastatic
- Artifacts

Anatomical Structures



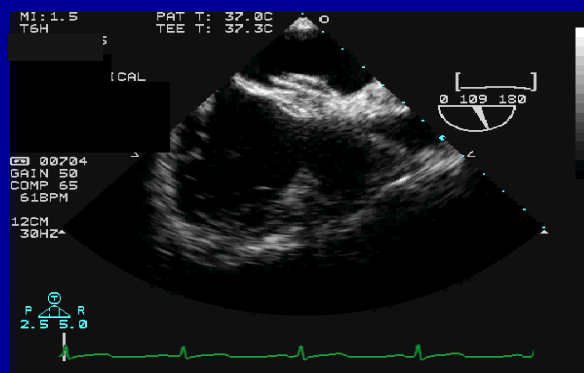
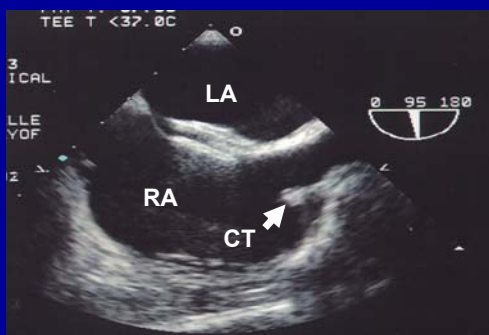
Anatomical Variants



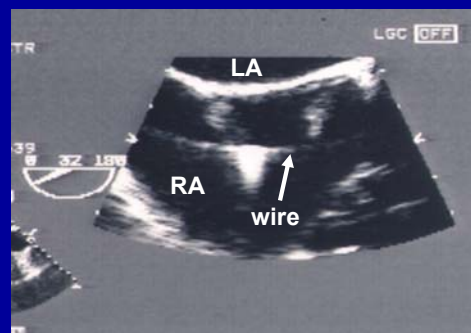
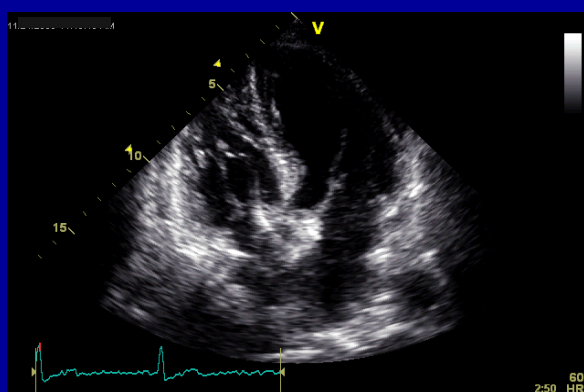
Implanted Devices

- Pacemaker leads
- Cardioverter-defibrillator leads
- Right heart catheters
- Occluder devices
- Prosthetic valves/ring/clips
- Foreign bodies

Implanted Devices



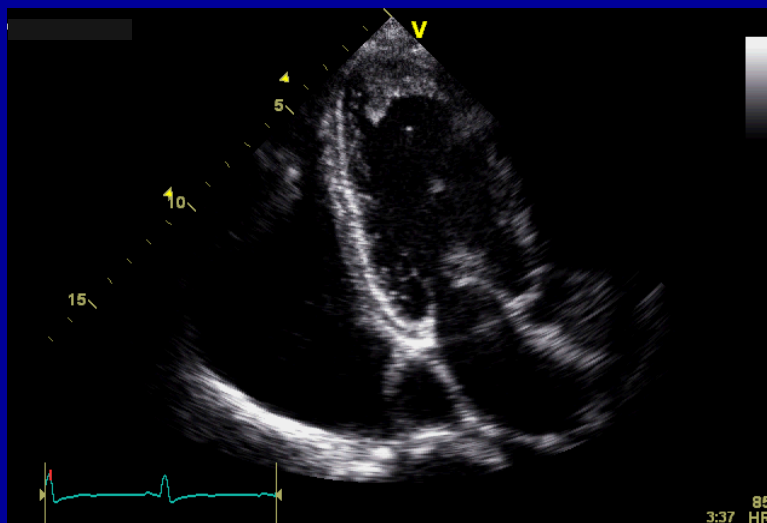
Implanted Devices

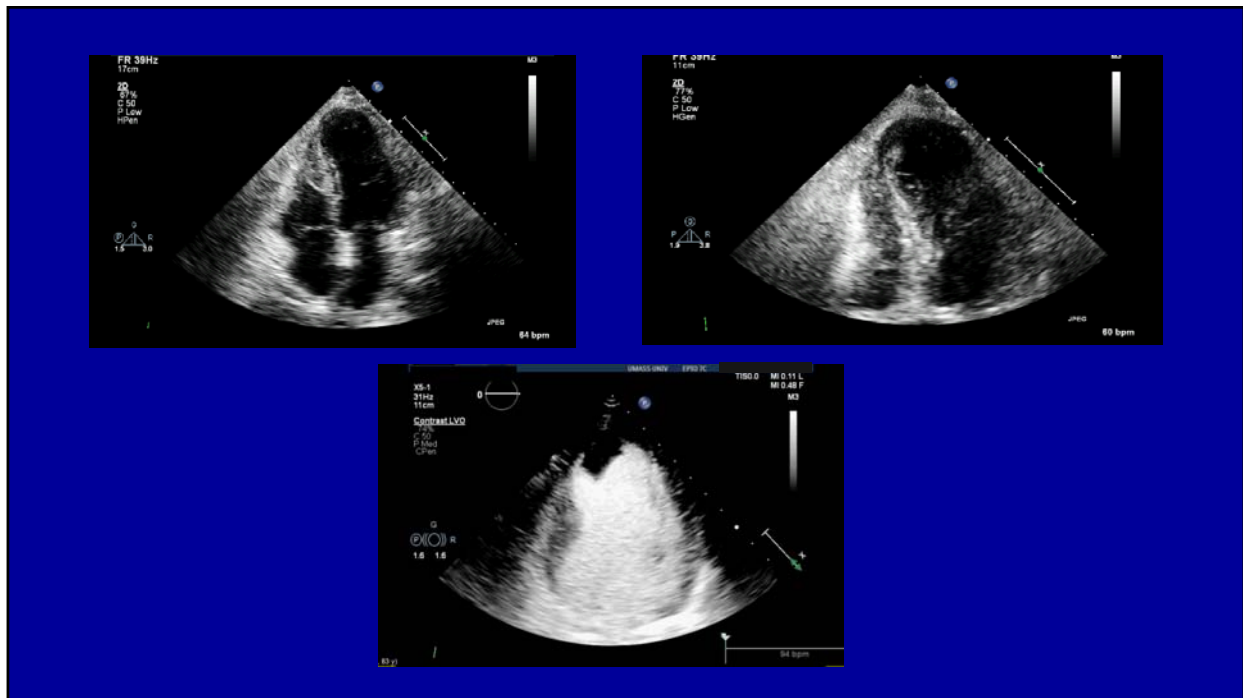


Thrombus

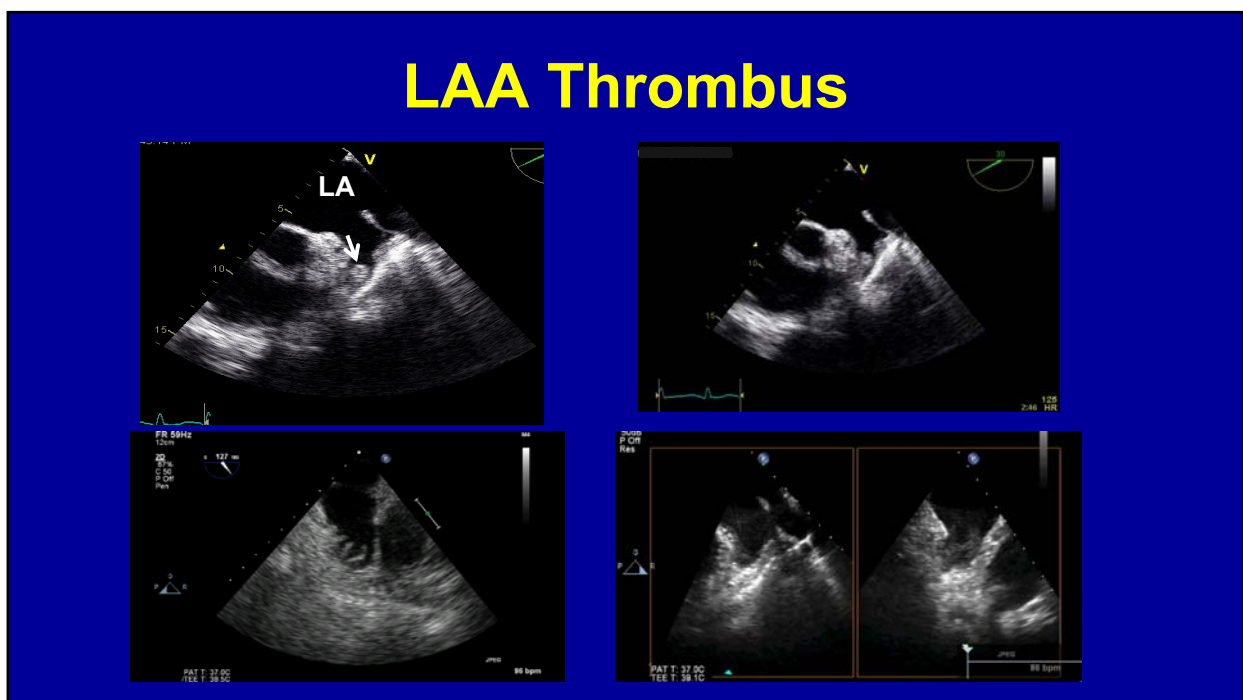
- Most commonly encountered intra-cardiac mass
- Often associated with cardiac pathology
 - LV thrombus
 - Apex most common
 - Acute MI
 - » Estimated 4-15% patients with anterior MI
 - Dilated cardiomyopathy
 - DDx: false tendons, trabeculations, artifacts, apical hypertrophy, tumors, non-compaction, HES
 - LA thrombus
 - Appendage
 - Body
 - Right heart thrombus
 - Catheter-related
 - Pulmonary embolism
 - RA Appendage
 - RV apical area

LV Thrombus

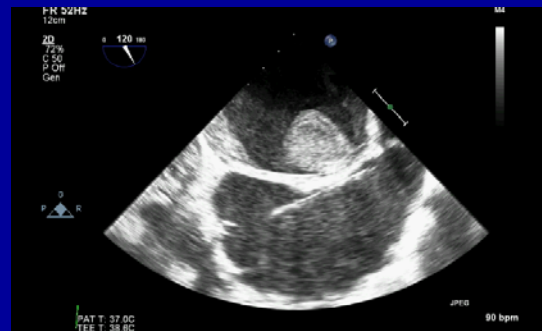
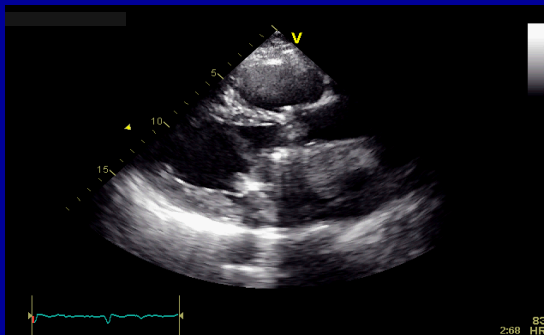




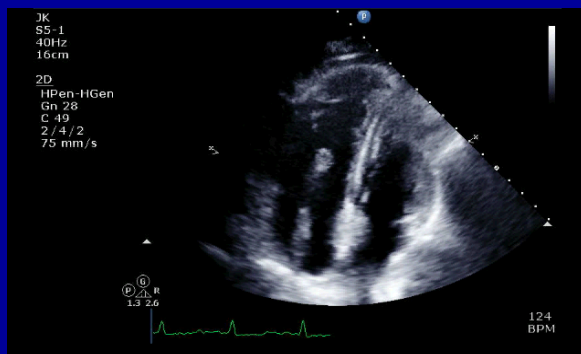
LAA Thrombus



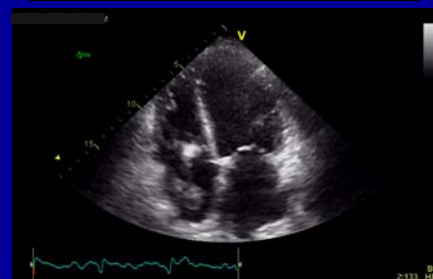
LA Thrombus



Right Heart Thrombus



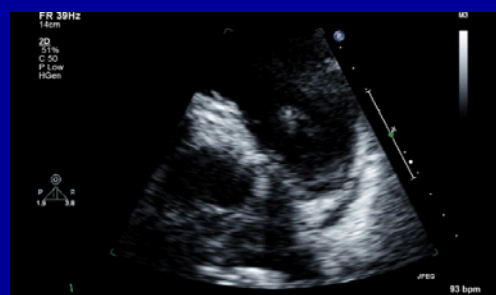
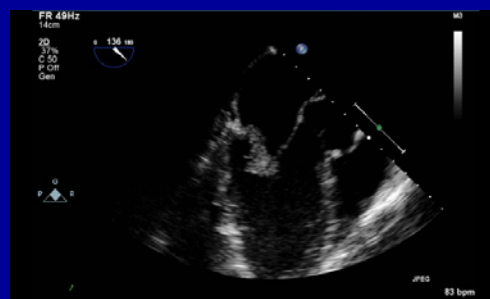
Pulmonary Embolism

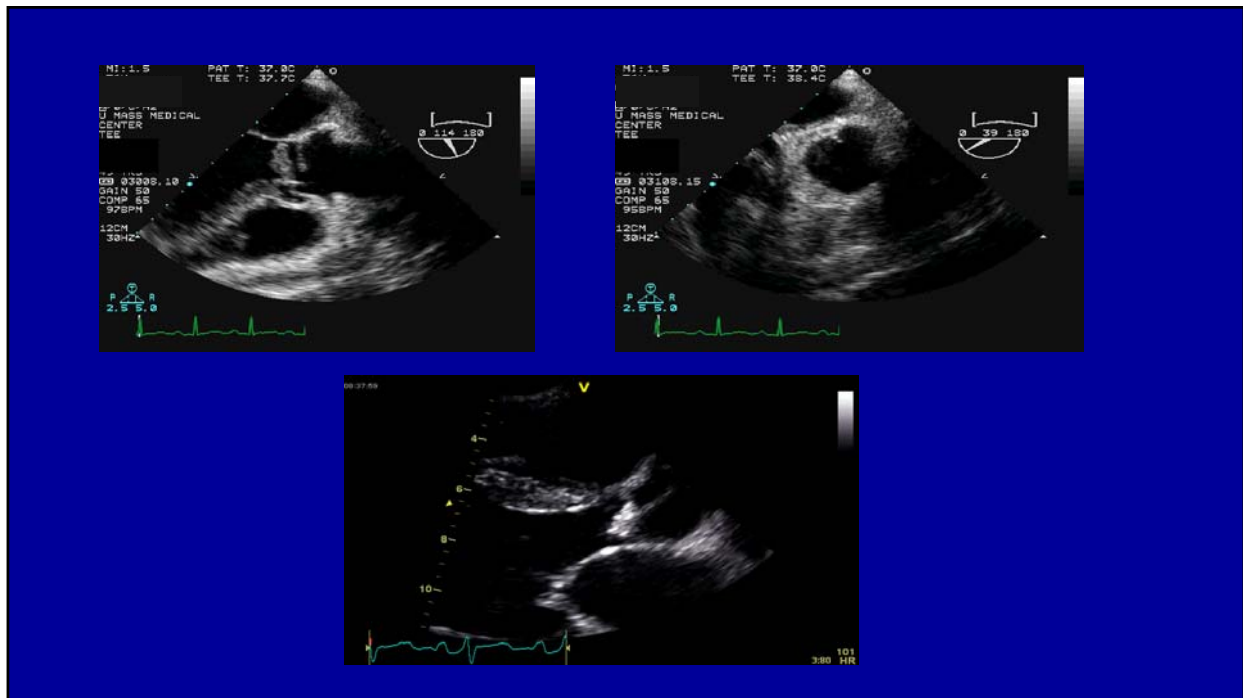


Catheter-related

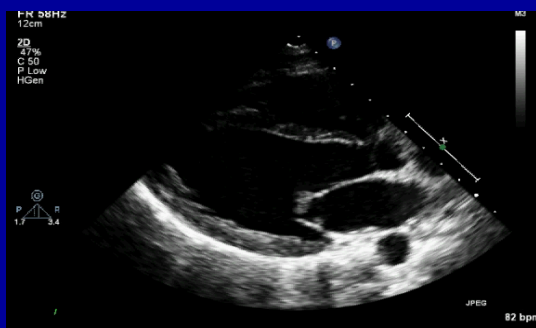
Vegetations

- Locations:
 - Valve surfaces, areas of endocardium opposite intra-cardiac shunts, or prosthetic materials
 - Atrial surface mitral valve
 - Ventricular surface of aortic valve
- Characteristics:
 - Mobile, oscillating
 - Tissue density differing from surrounding tissue
 - May calcify if chronic/healed
- Valve dysfunction may occur
 - Valvular regurgitation
 - Valvular stenosis (if large enough)
- Infective or non-infective

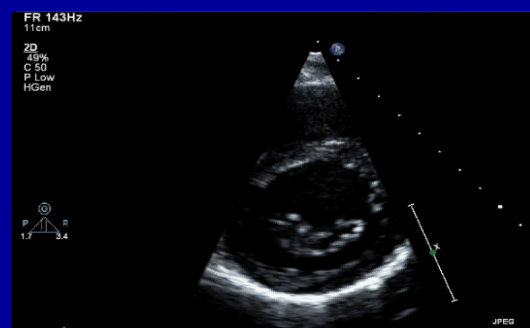




Marantic Endocarditis



PSLAX



PSSAX

Cardiac Tumors

- Primary
 - Rare
 - 0.017% to 0.033% of autopsies
 - Benign vs. malignant
- Secondary (Metastatic)

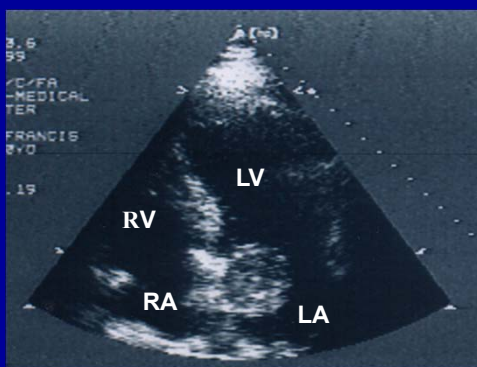
Primary Cardiac Tumors

- | | |
|-----------------|-------------------|
| • Benign (80%) | • Malignant (20%) |
| – Myxoma | – Sarcoma |
| – Fibroelastoma | – Lymphoma |
| – Rhabdomyoma | – Mesothelioma |
| – Fibroma | |
| – Lipoma | |
| – Hemangioma | |
| – Teratoma | |
| – Paraganglioma | |

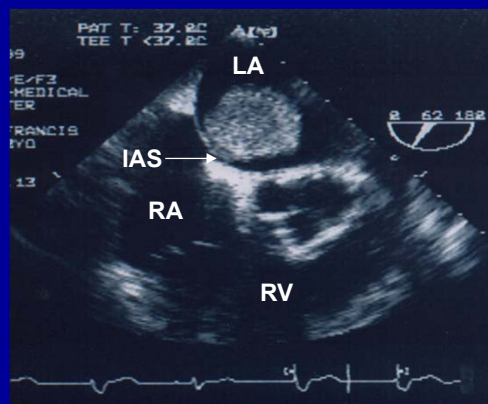
Cardiac Myxoma

- (Most) common primary cardiac tumor
- Majority are sporadic
 - 10% familial
 - Can recur and may be multi-centric
- Most frequently discovered 3rd to 6th decades
- Female preponderance (60-70%)
- Can arise anywhere within the heart
 - About 75% occur in the left atrium near fossa ovalis
 - Stalk
- Clinical presentation
 - Constitutional, embolic or obstructive symptoms
 - Many detected asymptotically

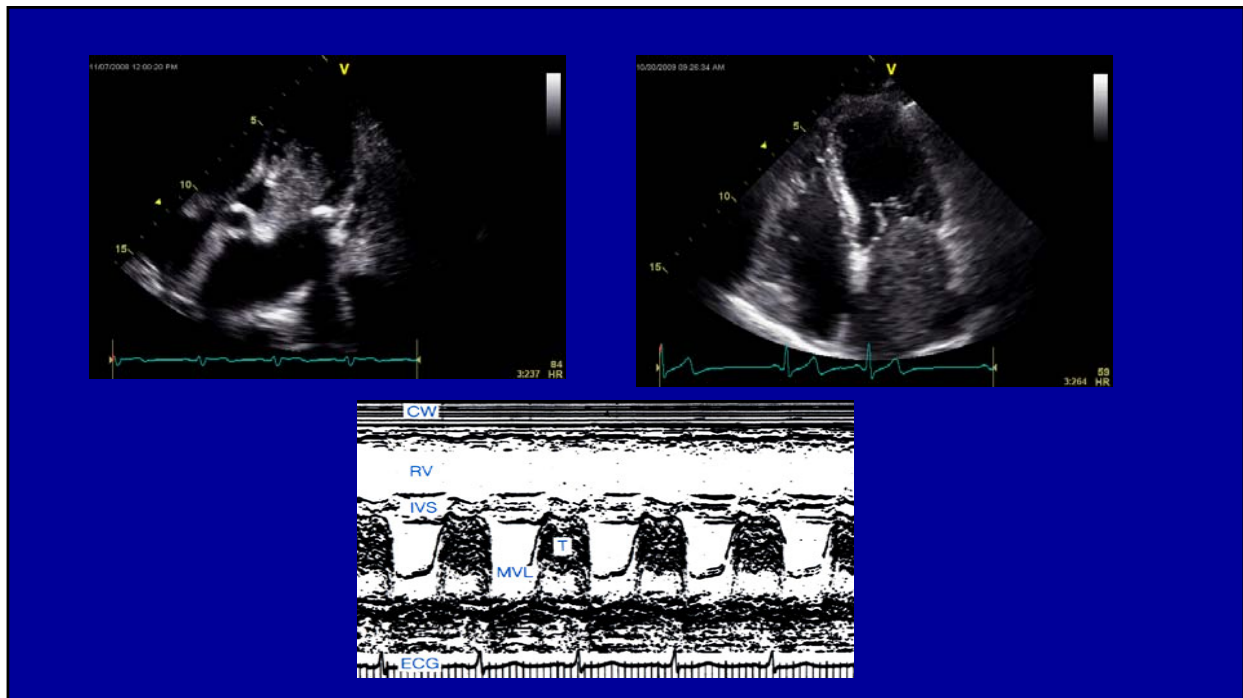
LA Myxoma



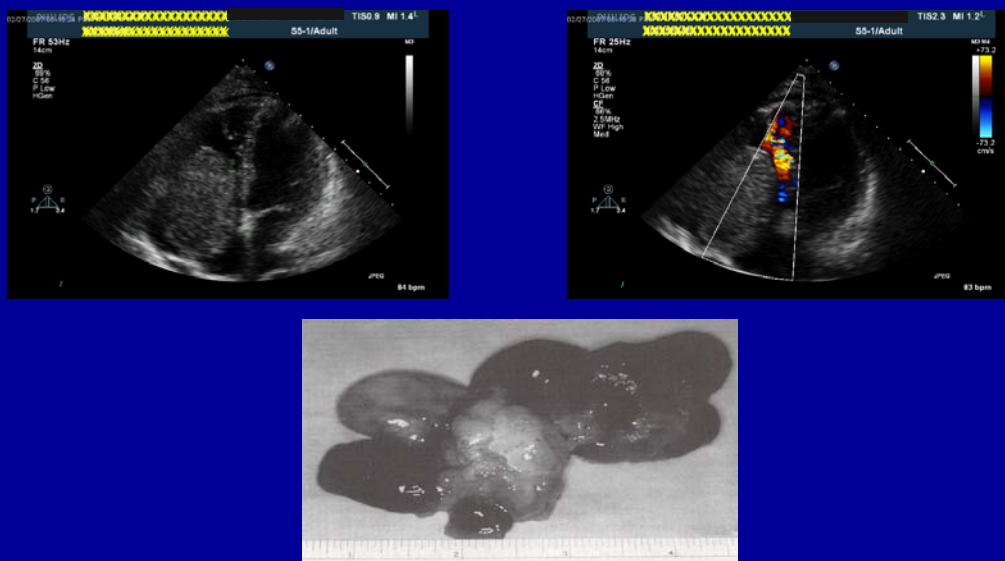
TTE



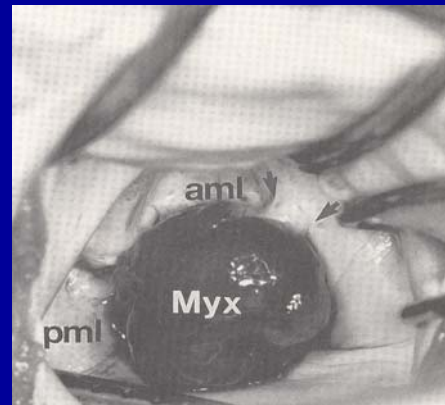
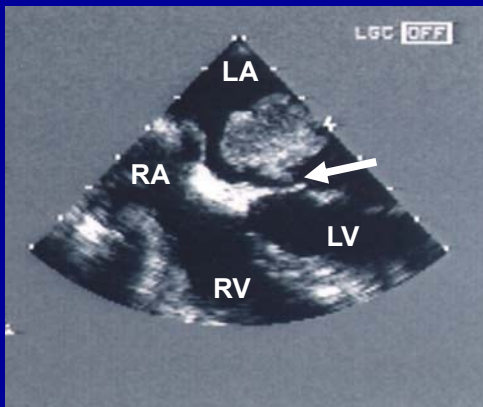
TEE



RA Myxoma

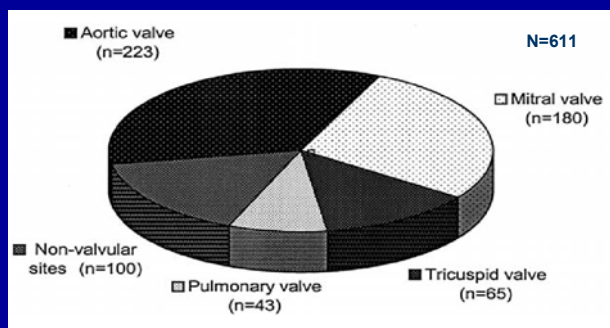


Valvular Myxoma



Papillary Fibroelastoma

- (Second most) prevalent adult 1° cardiac tumor
 - Commonly involves cardiac valves
 - Aortic valve most common location
 - Both surfaces show equal prevalence
 - Other cardiac structures/chambers (15-25%)
- Majority found in left heart
- Pathology:
 - Pedunculated, avascular, papillary fronds
 - Mid-portion of the valve
 - Usually do not cause valvular dysfunction
- Significant embolic potential recognized



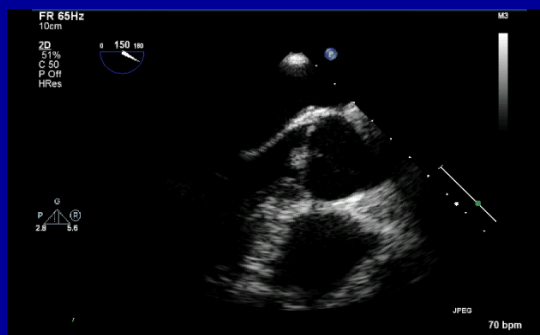
Gowda RM et al. Am Heart J 2003;146:404.

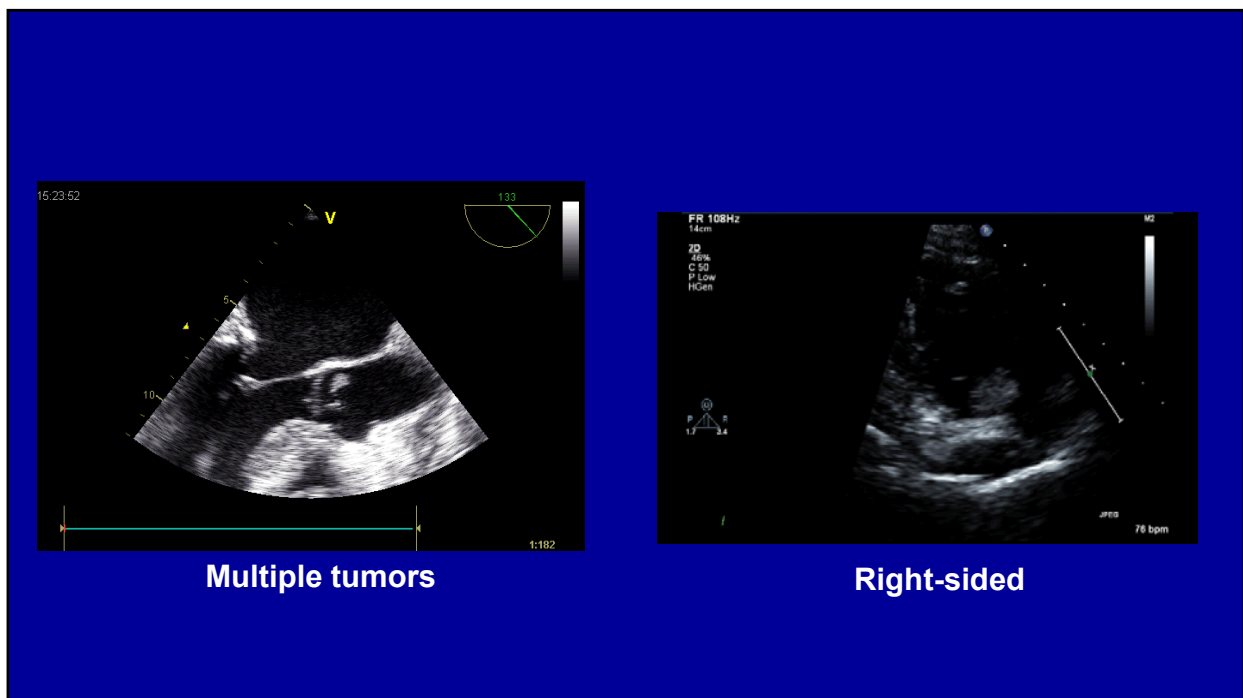
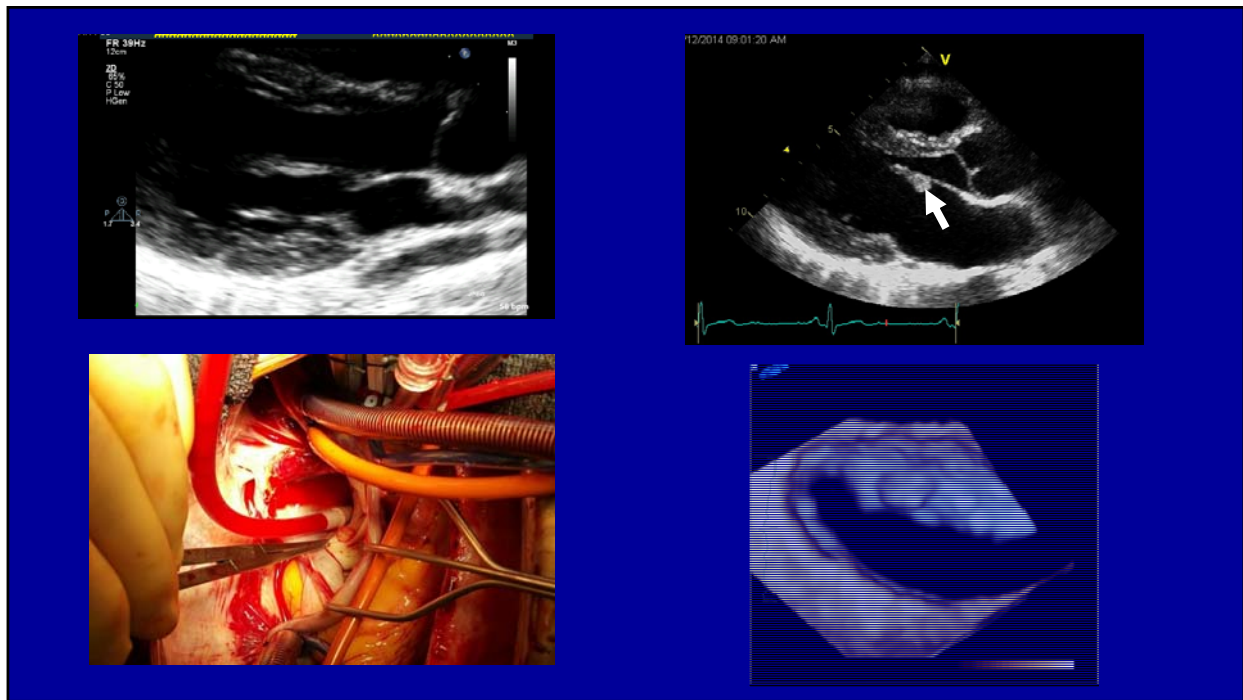


Weems WB et al. J Am Soc Echocardiogr 2002;15:382.



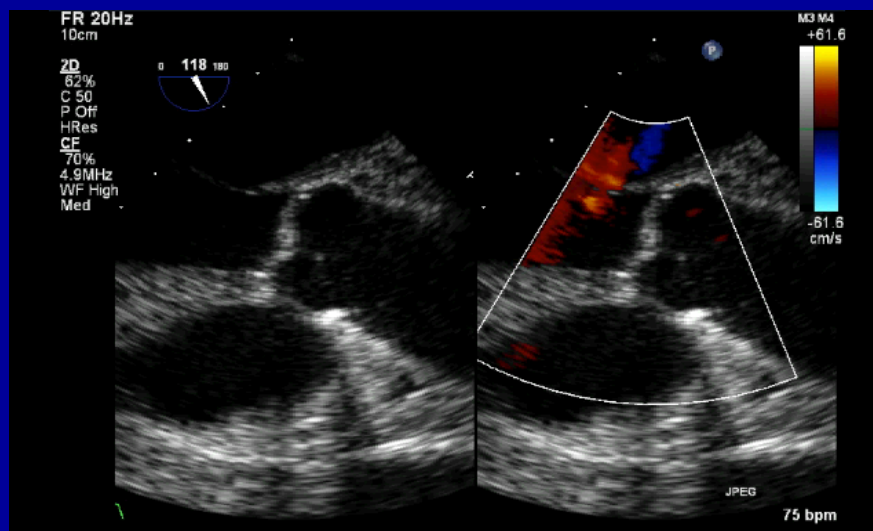
Klarich KW et al. J Am Coll Cardiol 1997;30:784.





Lambl's Excrescences

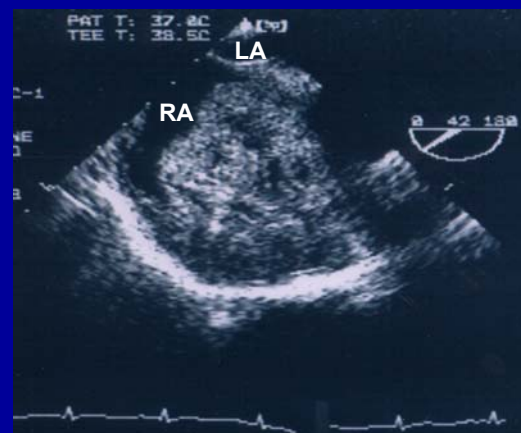
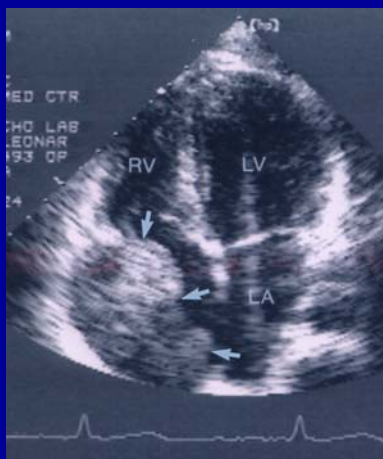
- Common
 - Found in 70-80% adults
- Pathology:
 - Linear, filiform fronds
 - Multiple
 - Located at closure lines
 - Ventricular surface of semilunar valves
 - Atrial surface of mitral valve
- Do not interfere with valve function

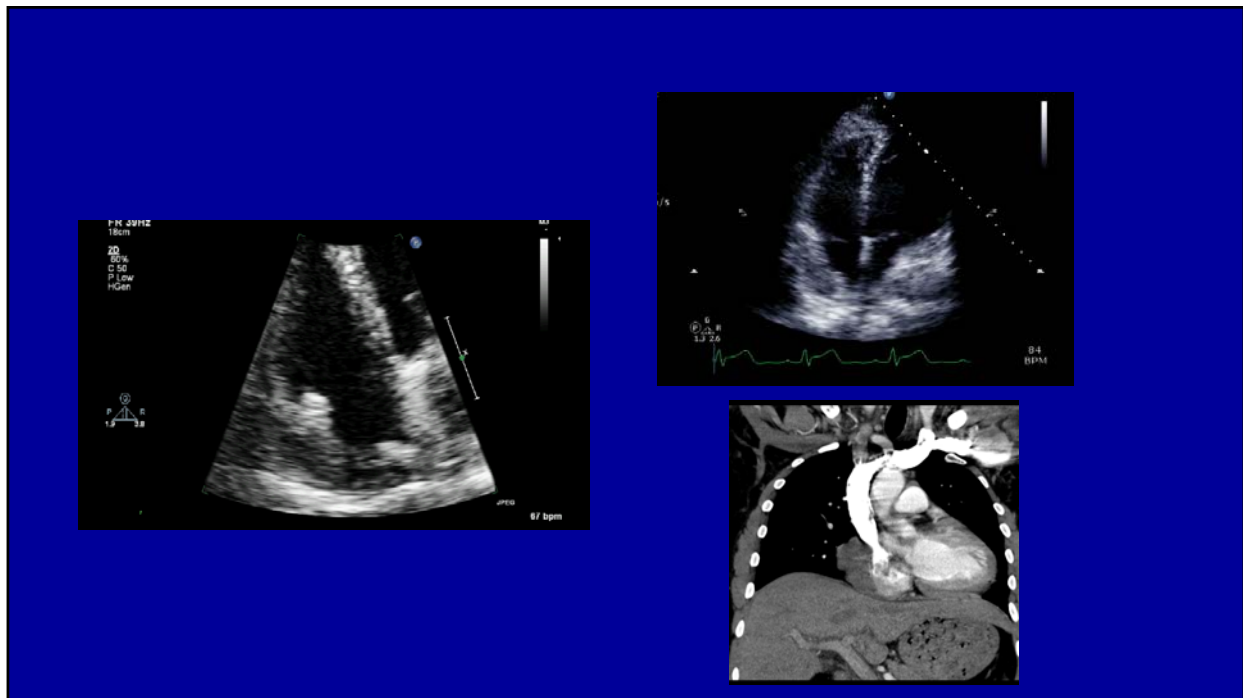


Malignant Primary Cardiac Tumors

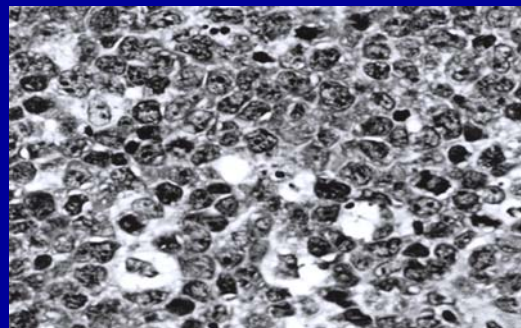
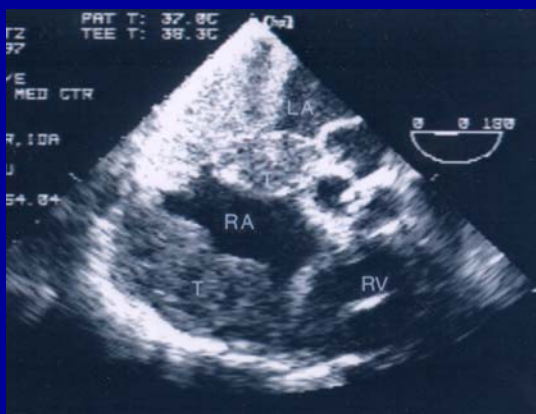
- **Sarcomas (65%)**
 - Angiosarcoma
 - *Usually found in right atrium/right AV groove*
 - Highly invasive
 - Metastases common
 - Other types (*left atrium more common*)
 - Undifferentiated pleomorphic sarcoma
 - Rhabdomyosarcoma (ventricles)
 - Fibrosarcoma
 - Leiomyosarcoma
 - Osteosarcoma (calcification)
 - Synovial sarcoma
- **Lymphomas (27%)**
- **Mesotheliomas (8%)**
 - Arise from pericardium
 - Rarely may involve conduction system
- **Paragangliomas**

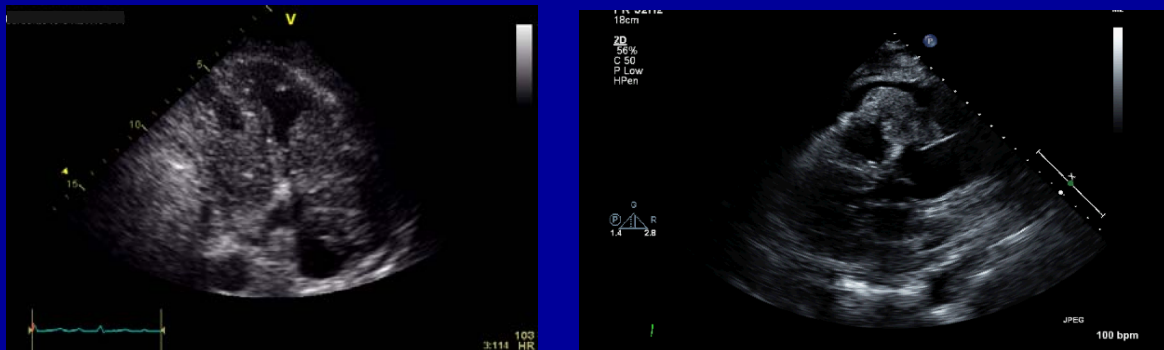
Angiosarcoma





Primary Cardiac Lymphoma



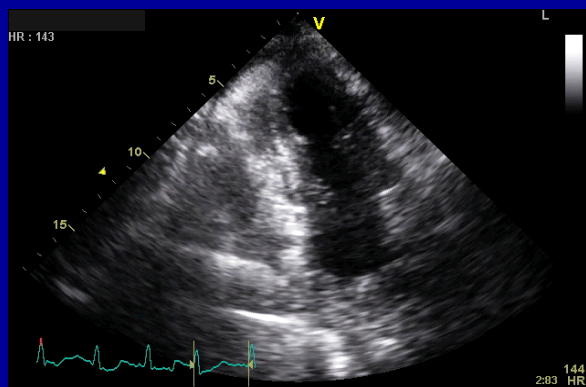
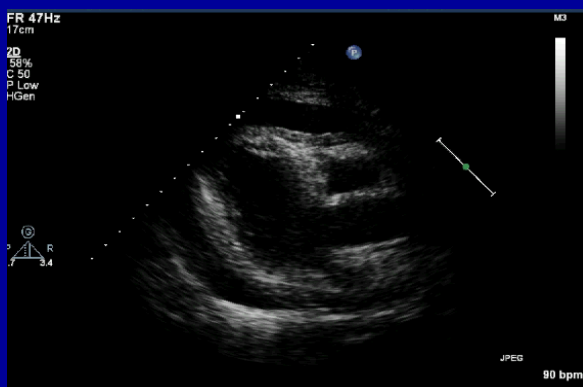


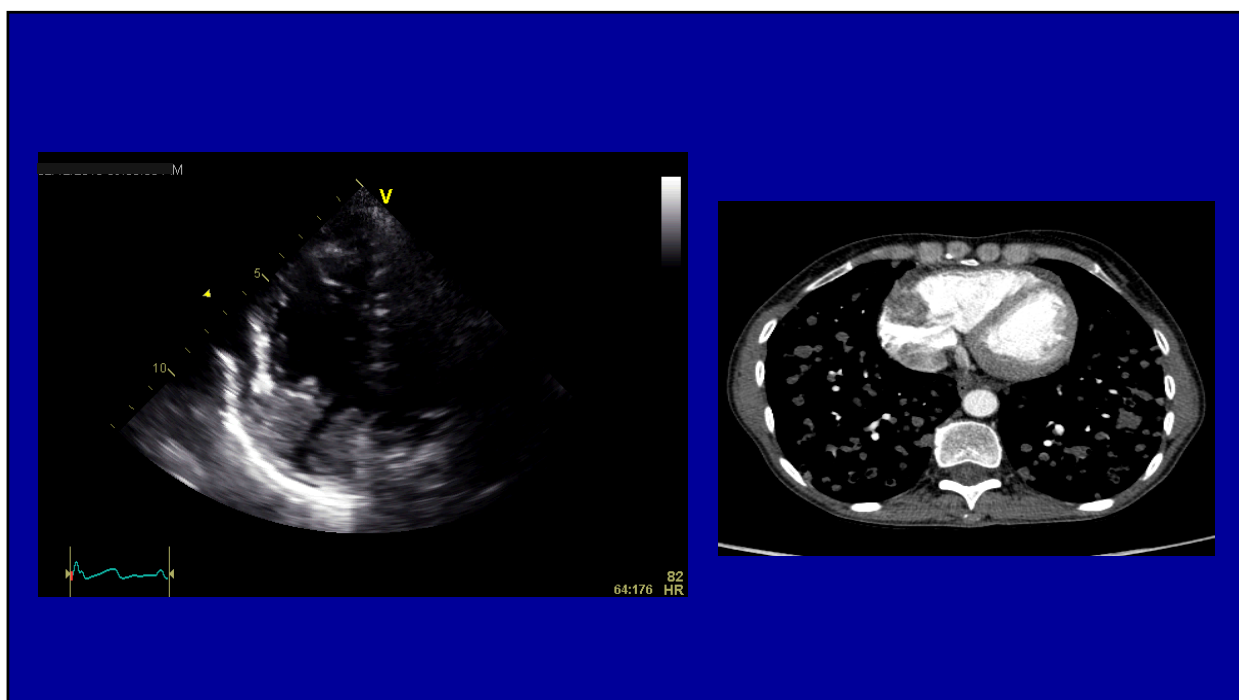
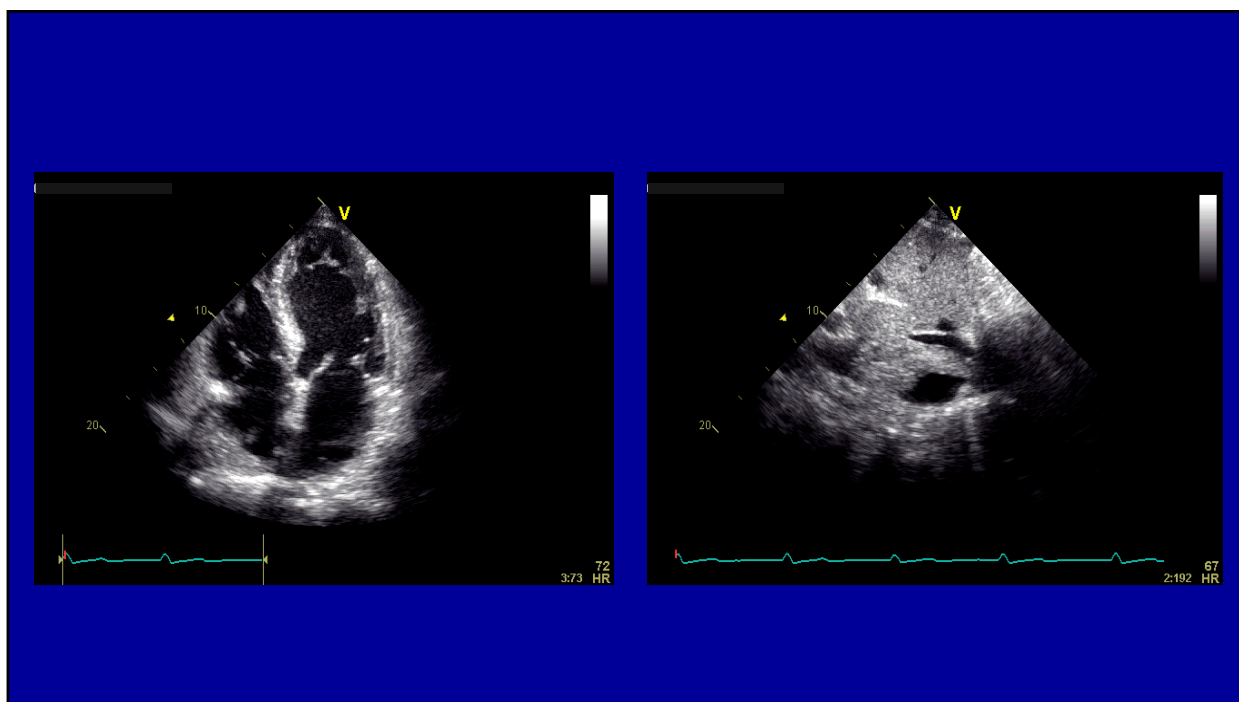
Secondary (Metastatic) Cardiac Tumors

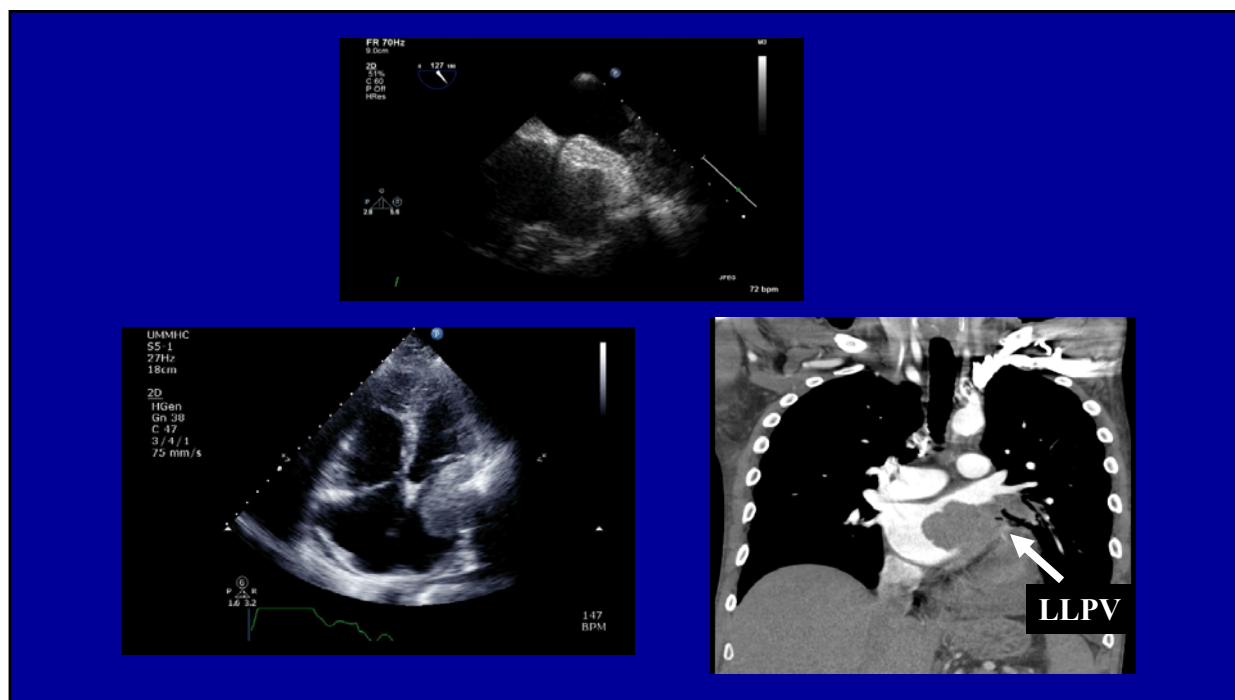
- At least 20-to-40 times more common than primary cardiac tumors
 - 10-20% cancer patients
 - Consider with known malignancy and new CV symptoms
- Most frequently encountered:
 - Breast and lung cancer
 - Hematologic malignancies
- Malignant melanoma has highest propensity for metastasis to the heart

Secondary (Metastatic) Cardiac Tumors

- Pericardial involvement
 - Most common
 - Pericardium > Myocardium > Endocardium
- Hematogenous/Lymphatic spread
 - Melanoma, lymphoma, breast
- Direct extension
 - Lung, breast, esophageal
- Invasion via venous structures
 - Vena cava
 - Renal, hepatocellular, uterine
 - Pulmonary veins
 - Lung, breast, thyroid



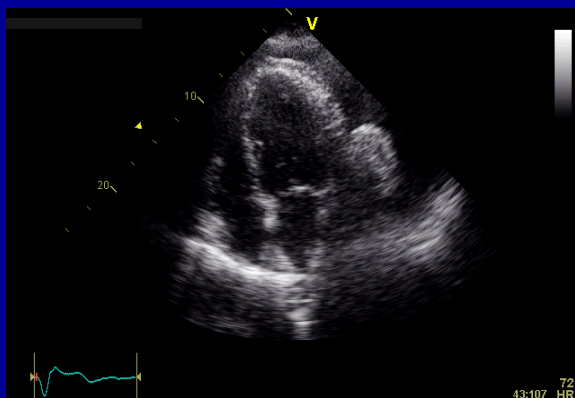
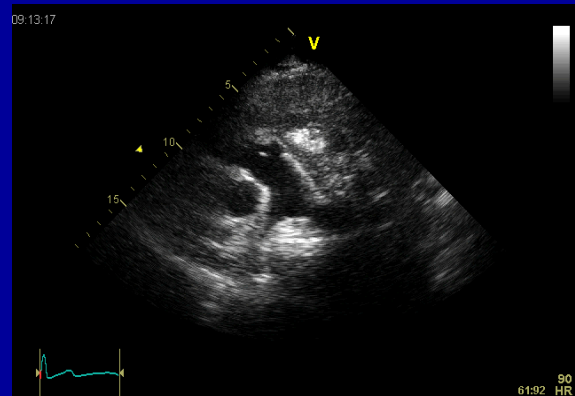
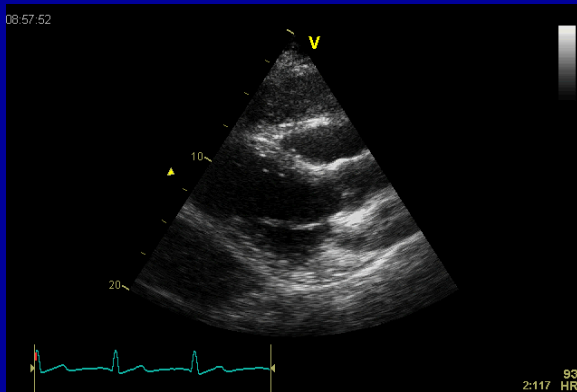


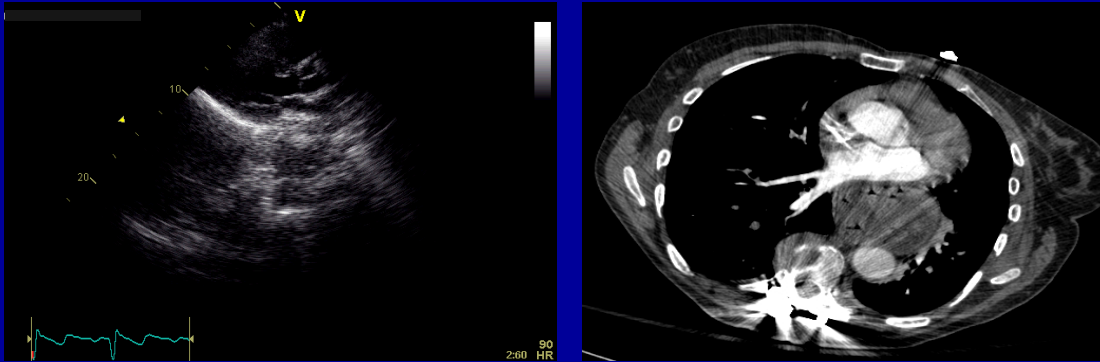
**Table 2** Cardiac tumours, by site and general imaging characteristics

Site, imaging characteristics	Most likely	Others
Left atrium, cavitory (pedunculated or broad based attachment)	Myxoma	Sarcoma, metastasis (extension of lung primary), haemangioma, paraganglioma
Left atrium, involving wall/pericardium	Sarcoma (fibrous or myogenous differentiation)	Lymphoma, metastasis, haemangioma, paraganglioma
Right atrium (cavitory mass)	Myxoma	Idiopathic thrombus, lipomatous hypertrophy, metastasis (especially renal cell, hepatocellular carcinoma), haemangioma
Right atrium, involving wall/septum pericardium	Angiosarcoma	Lipomatous hypertrophy, lymphoma, haemangioma, paraganglioma
Valve	Papillary fibroelastoma	Myxoma, hamartoma
Ventricle (cavitory mass)	(Rare)	Sarcoma, lipoma, haemangioma, myxoma, idiopathic thrombus, metastasis (right ventricle), inflammatory myofibroblastic tumour
Ventricle, involving wall	(Rare)	Haemangioma Lipoma
Pericardium	Metastasis	Lymphoma sarcoma, including rhabdomyosarcoma Mesothelioma, lymphoma, sarcoma, (especially angiosarcoma, synovial sarcoma), haemangioma, lymphoma, solitary fibrous tumour, lipoma

Burke A et al. Heart 2008;94:117-123.

Extra-Cardiac Masses





Thank you for your attention